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THE ACTION OF DIAZOMETHANE ON URACIL

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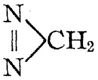
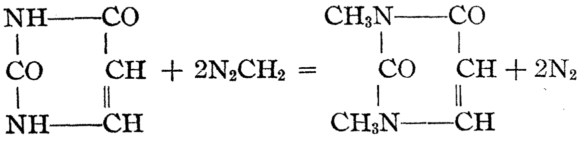
Communicated Jan. 25, 1922

In the course of work now in progress on the determination of constitution of nucleic acid and its primary hydrolytic products—neucleotides and neucleosides—it has finally become necessary to develop and utilize a new method for introducing methyl radicals into pyrimidine and purine combinations. The alkylation methods generally employed for bringing about such changes, namely, by interaction of alkali or silver salts with methyl iodide and dimethyl sulphate, have not proven satisfactory, and it has become necessary to turn to a reagent that will interact directly with the pyrimidine nucleus at a low temperature and in other solvents than water or alcohol. A reagent which has found little use thus far in biochemical research and which gives promise of proving extremely helpful in the solution of our problem is the very reactive aliphatic reagent, diazomethane:



We now find that pyrimidines of the type of uracil interact smoothly with this reagent in ether solution at ordinary temperature. The reaction is productive of nitrogen-alkyl derivatives and in the case of the pyrimidine uracil leads to the formation of 1,3-dimethyluracil in good yield. The interaction of uracil and diazomethane may be expressed, therefore, as follows:



The reaction in question is applied by suspending dry, pulverized uracil in dry ether containing an excess (4–6 moles) of diazomethane and allowing the mixture to stand at ordinary temperature until the uracil completely dissolves. The reaction is complete in about 4 days when working with uracil in units of one gram. The dimethyl uracil is obtained in the form of slender colorless prisms which melt at 121.5° C. (Nitrogen determination: calculated, 20.03%; found, 19.87%.)

The study of the behavior of thymine and cytosine is now in progress. The results thus far obtained by alkylation with this reagent indicate that we may be able to use it with success for the detection of replaceable hydrogens in the more complicated pyrimidine and purine glucosides.

Where CO.NH groupings functionate in such constructions it should be possible to replace hydrogen in such amide groupings with methyl by action of this reagent. The hydrolysis of the products of alkylation should lead to the formation of methyl derivatives of known constitution, thereby contributing new knowledge regarding the constitution of the parent substances. The final results of our researches will be published in the *Journal of the American Chemical Society.*

ABSORPTION OF SHORT X-RAYS BY ALUMINIUM AND COPPER

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Communicated, February 1, 1922

1. In 1914 one of us presented to the American Roentgen Ray Society and to the American Physical Society descriptions of methods of measuring the average or "effective" wave-length of a beam of X-rays, without the use of an X-ray spectrometer. Mr. Hunt and one of us[1] have shown that even if a constant voltage (from a storage battery, for instance) drives a current through an X-ray tube the resulting X-rays are not monochromatic but contain X-rays covering a considerable range in the spectrum, that depends upon the absorption of the matter through which the rays pass, as well as upon the voltage applied. We define the term "effective" wave-length to mean the wave-length that has the same absorption in a given case as that of the whole beam. For many purposes this "effective" wave-length appears to be an important wave-length to know. The methods of estimating it described in 1914 were based upon a measurement of the absorption of the beam of X-rays in aluminium or copper and the determination of the wave-length from a curve giving the relation between the absorption of monochromatic X-rays and their wave-lengths. Curves were drawn from all the data available at the time representing this relation. It was proved that over a very wide range of wave-lengths, namely, from about 3 ångströms down to .35 of an ångström, the relation between the mass coefficients of absorption and the wave-lengths could be reasonably well represented by the equation

$$\frac{\mu}{\rho} = 14.9\,\lambda^3, \qquad (1)$$

where $\frac{\mu}{\rho}$ is the total mass coefficient of absorption and λ is the wave-length in ångströms.

Since 1914 Hull and Rice[2] and Richtmyer[3] have measured the coefficients of absorption in aluminium and copper for wave-lengths lying between .75 and .135. They find that the relation between the mass co-